

California's Electricity Crisis: What Happened and Why?

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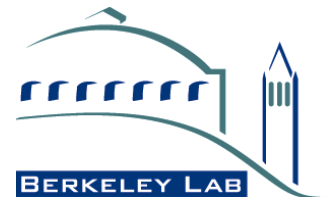
Electricity Markets and Policy Group

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EETD's California Energy Seminar:
January 26, 2001



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Outline of Today's Talk

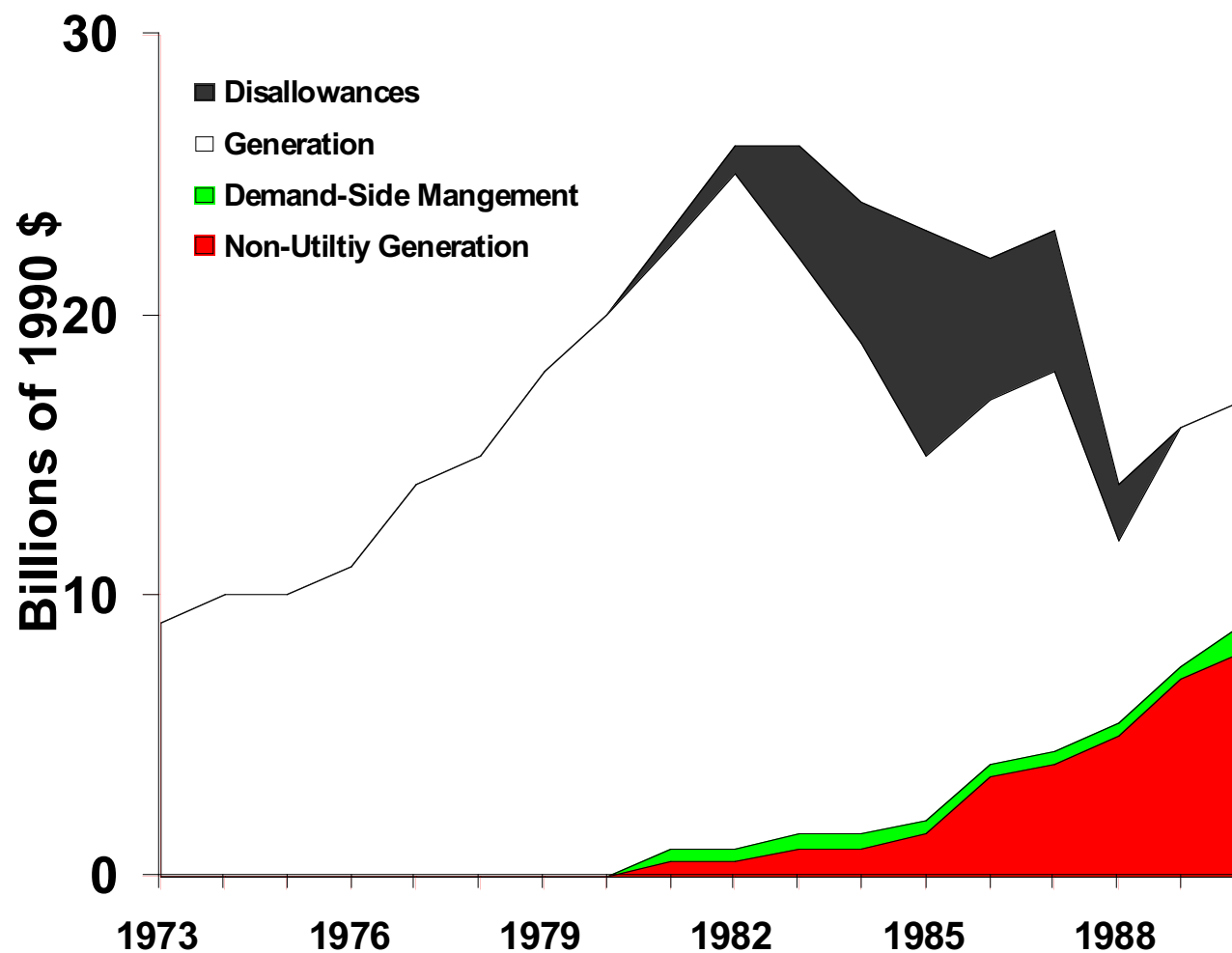
- How Did We Get Here?
- What Has Happened?
- Why?



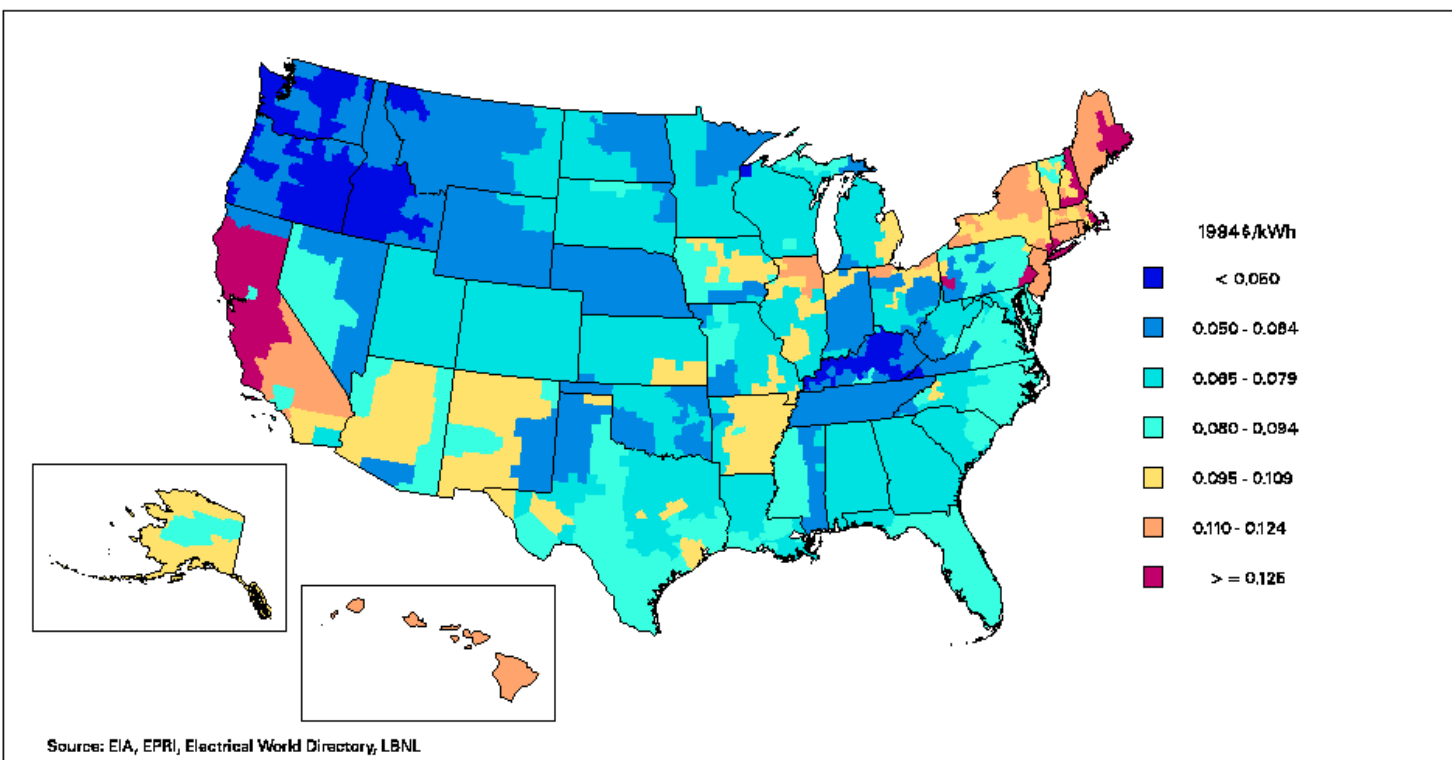
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Investor-Owned Utility Investment in Generation Declined in the 1980's



High Electricity Prices Were a Strong Driver for Restructuring - 1993



County boundaries were used as building blocks to approximate electric utility boundaries.

This work was based on data from the EPRI and the Electrical World Directory. Areas that were not assigned to a utility are assigned the state average utility price. Price data for investor owned utilities is from the Energy Information Administration, and all other utility price data is from the Electrical World Directory.

elec94.aml, 01/15/97

Main Features of AB1890

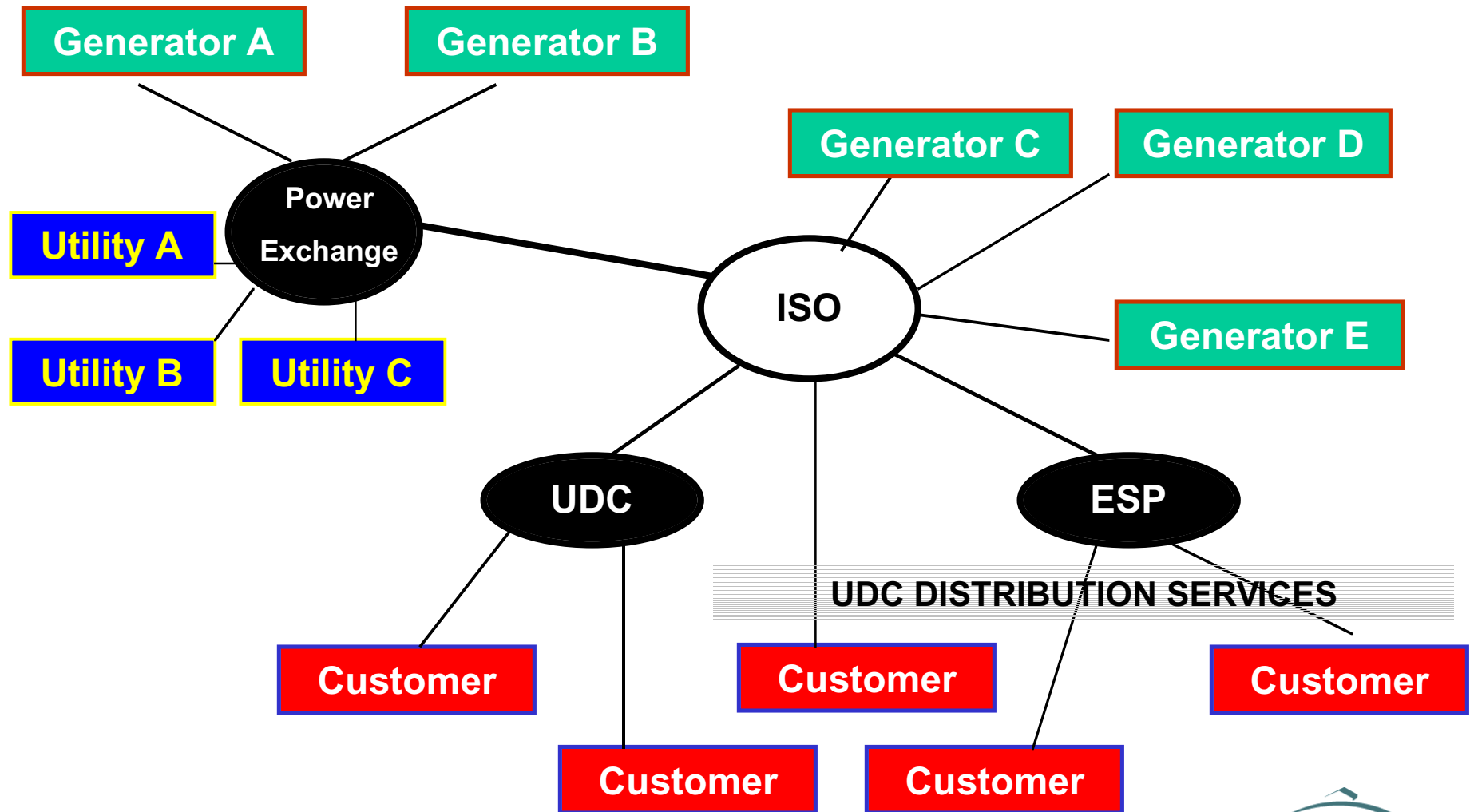
- State Backs Refinancing of Utility Debt
- PG&E/SCE Directed to Sell-off 50% of Thermal Capacity
- PX Created for Wholesale Power Transactions - Utilities Required to Buy Through It
- ISO Created to Manage Grid Operations/Reliability
- Direct Access for Retail Customers
- Electricity Rates Frozen at a Discount
- Funding for Public Benefits Assured



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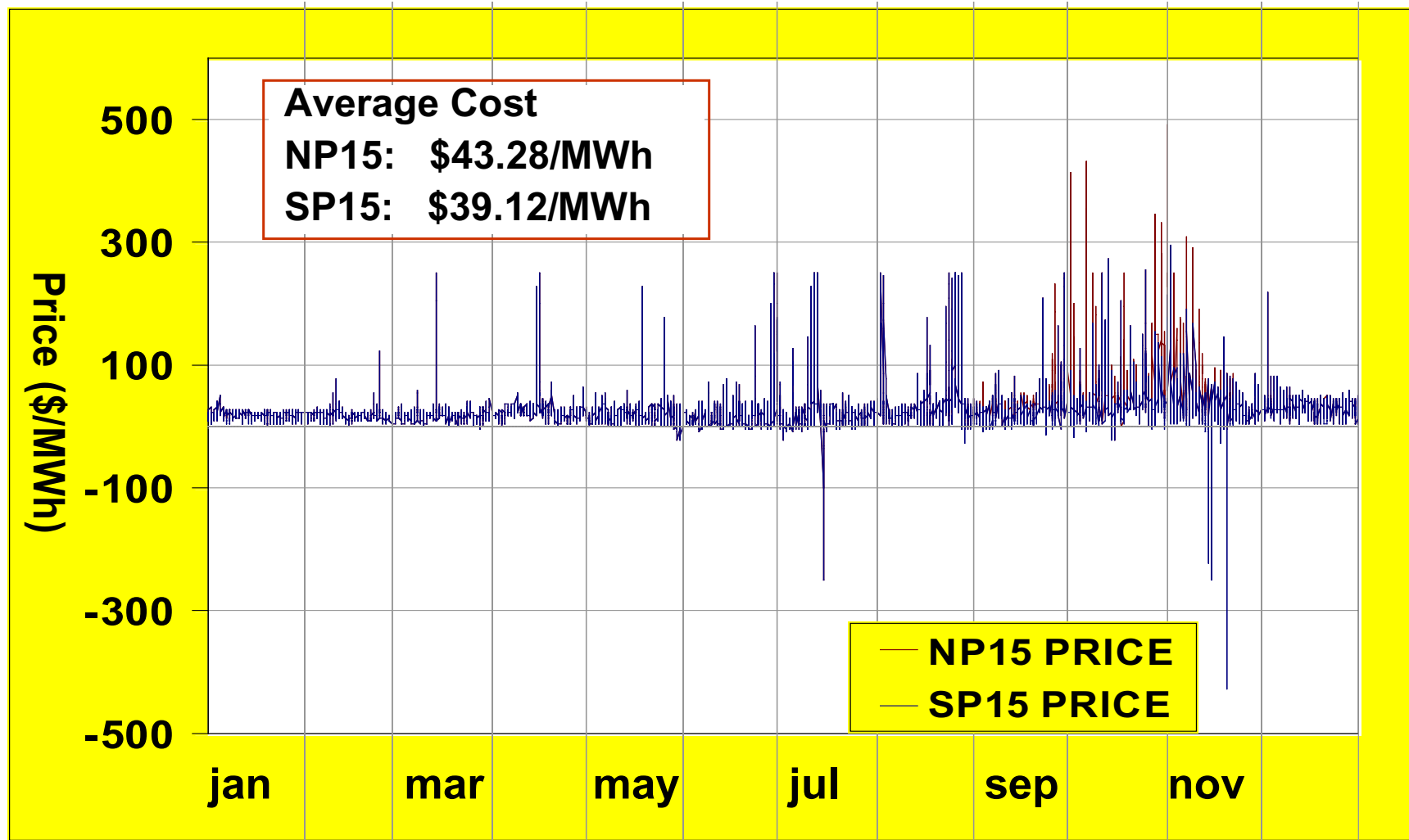
California Market Structure



California's Electricity Emergencies Have Increased in Frequency

Normal Operation	1998	1999	2000
Stage 1 Emergency Reserves falling below 7% Public Alert - voluntary conservation	7	5	55
Stage 2 Emergency Reserves falling below 5% Curtail interruptible loads. 2700 MW available	5	1	36
Stage 3 Emergency Reserves falling below 1.5% Curtail non-interruptible loads. Rolling blackouts	0	0	1

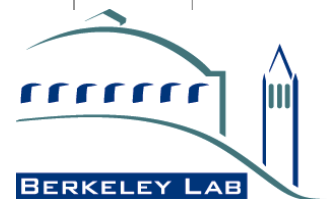
Imbalance Energy Price 1999



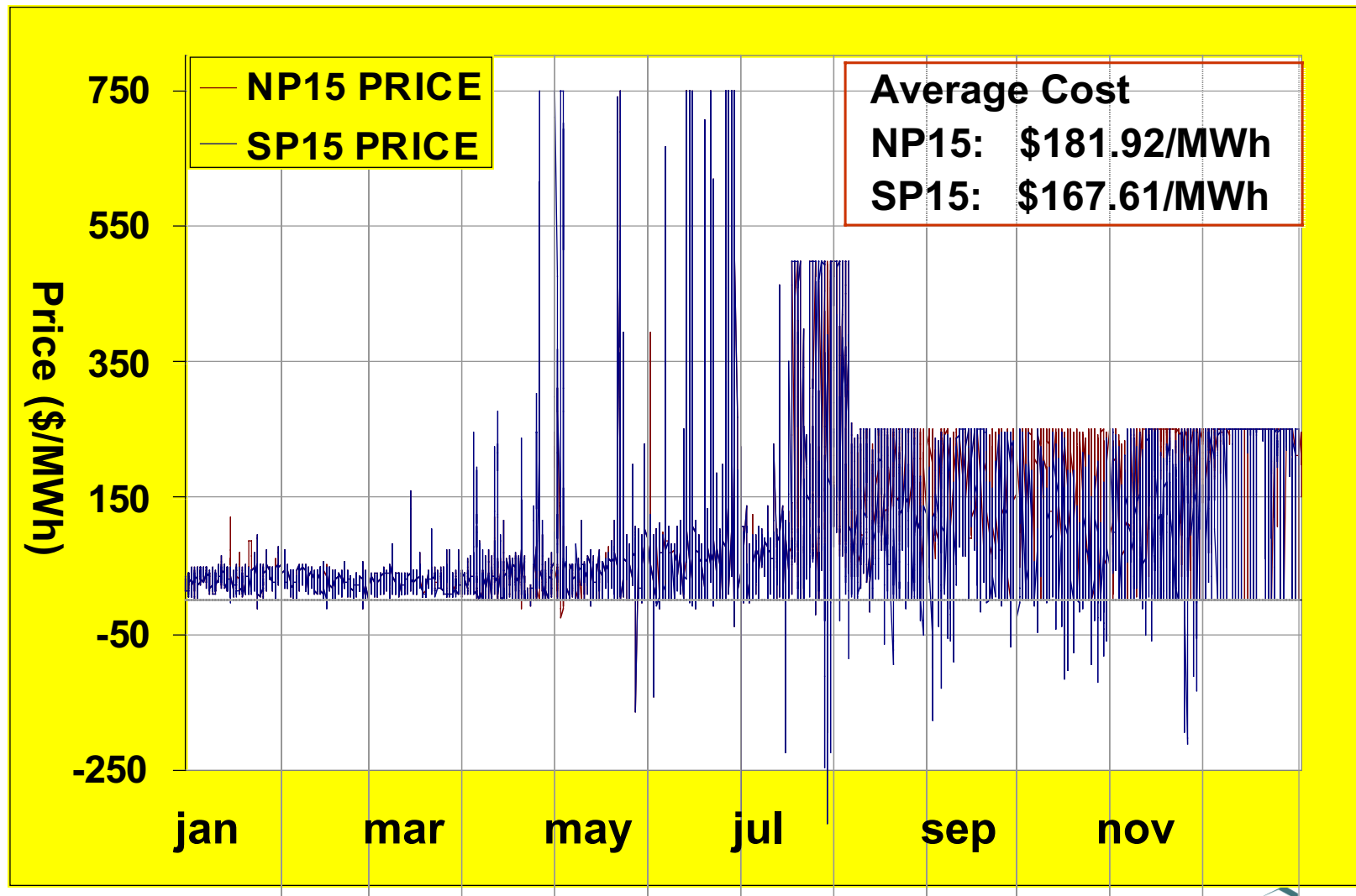
source: California ISO



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Imbalance Energy Price 2000



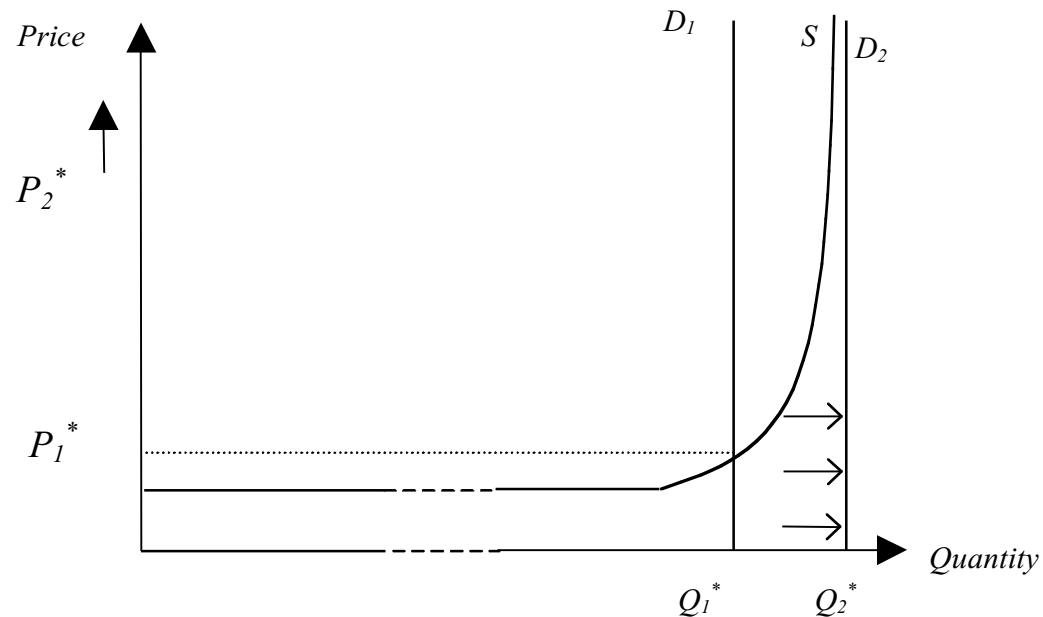
source: California ISO



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Effect of Inelastic Electricity Demand



Ownership of Major Generation Plants

IOU Owner	Station	Current Owner	Capacity (MW)
PG & E	Morro Bay	Duke Energy Corp.	2306
	Moss Landing		
	Oakland		
	Contra Costa	Mirant (former Southern Energy)	3520
	Pittsburgh		
	Potrero		
	The Geysers	FPL Group/Calpine	677
	Run-of-River Hydro	PG & E	3904
	Pondage		
	Pump Storage		
Edison	Diablo Canyon	PG & E	2160
	Alamitos	AES Corporation	3705
	Huntington Beach		
	Redondo Beach		
	Etiwanda	Reliant Corporation (former Houston Industries)	3554
	Ellwood		
	Mandalay		
	Cool Water		
	Ormand Beach		
	San Bernardino	Thermo Ecotek	249
	Highgrove		
	SONGS	Edison	3671
	Palo Verde		
	Four Corners		
	Intermountain	Dynergy (former Destec)	1429
	Mohave		
	El Segundo		
	Long Beach	San Diego Port	637
SDG&E	Encina		
	South Bay		
	SONGS	SDG&E	430

CEC Applications For New Generating Capacity

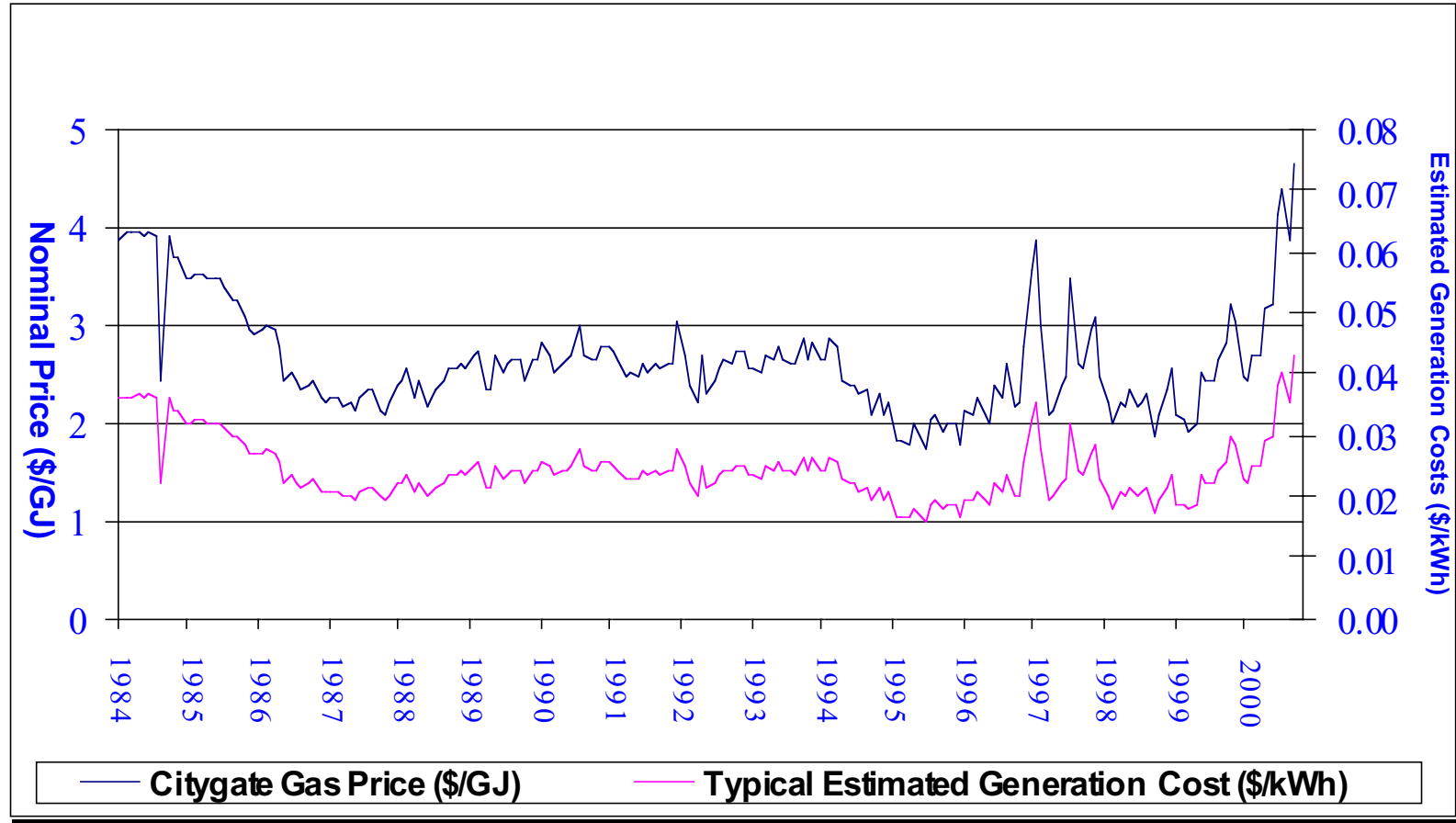
Name	Applicant	Location	Technology	Fuel	MW
High Desert Power Plant Project	Inland Energy, Newport Beach, CA	Victorville	combined cycle	gas	720
	Constellation Power Development, Baltimore, MD		combined cycle	gas	678
Sutter Power Project	Calpine Corporation	11.2 km W of Yuba City	combined cycle	gas	500
Sunlaw Cogeneration Partners Power Plant Project	Sunlaw Cogeneration Partners I (SCPI)	City of Vernon, LA County	combined cycle	gas	800
Pittsburg District Energy Facility	Pittsburg District Energy Facility, LLC	Pittsburg	gas turbine	gas	500
La Paloma Generating Project	La Paloma Generating Company, LLC	McKittrick, Kern County	combined cycle	gas	1048
		Antioch	combined cycle	gas	880
Delta Energy Center	Calpine Corporation and Bechtel Enterprises Inc., an affiliate of Bechtel Group Inc		combined cycle	gas	
Sunrise Cogeneration and Power Project	Texaco Global Gas and Power	Fellows, Kern County	combined heat and power	gas	300
Blythe Energy Power Plant Project	Blythe Energy, LLC	City of Blythe	combined cycle	gas	400
Three Mountain Power Plant Project	Three Mountain Power, LLC (Ogden Pacific Power)	Burney	combined cycle	gas	500
Otay Mesa Power Plant Project	PG&E	Otay Mesa, San Diego County	gas turbine	gas	510
Elk Hills Power Project	Sempra Energy Resources and Occidental Energy Ventures	40 km W of Bakersfield	combined cycle	gas	500
AES South City Power Plant Project	AES South City, LLC	South San Francisco	combined cycle	gas	550
AES Antelope Valley Power Plant Project	AES Antelope Valley, LLC	California City	combined cycle	gas	1000
Morro Bay Power Plant Project	Duke Energy Power Services	Morro Bay	combined cycle	gas	
Moss Landing Power Plant Project	Duke Energy Moss Landing LLC previously operated by PG&E	Moss Landing	combined cycle	gas	1206
Long Beach District Energy	ENRON	Long Beach			500
Pastoria Power Project	Pastoria Power Project LLC	40 km S of Bakersfield	gas turbine	gas	960
Midway Sunset Cogeneration Power Plant Project	Midway Sunset Cogeneration Company	Fellows, Kern County	combined cycle	gas	500
Metcalf Energy Center Power Project	constructed by Bechtel Enterprises Inc. and run by Calpine Corporation	San Jose	combined cycle	gas	600
Newark Energy Center Power Project	constructed by Bechtel Enterprises Inc. and run by Calpine Corporation	Newark	combined cycle	gas	600
Total					13252



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CA Citygate Weighted Natural Gas Price and Generation Costs



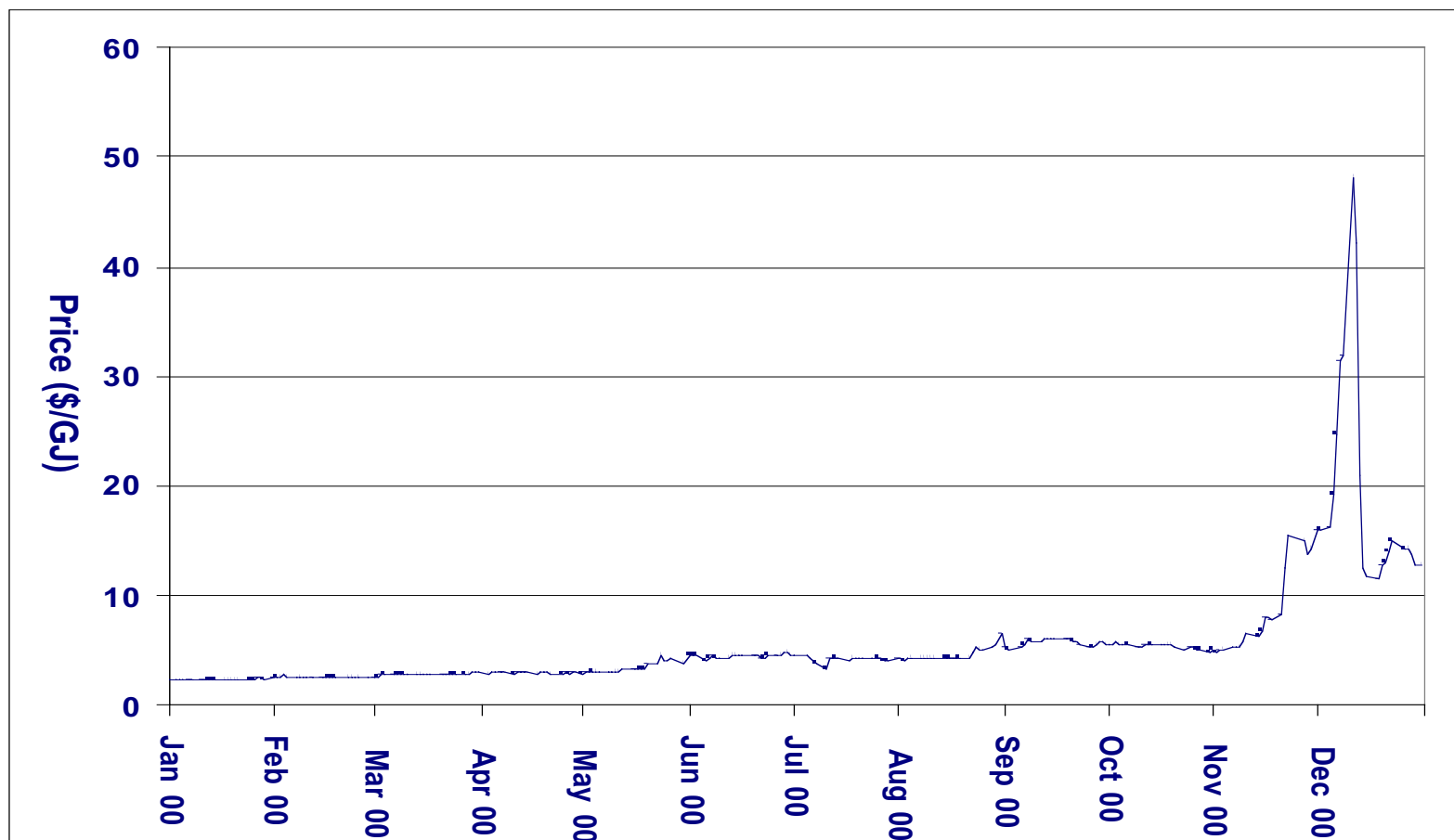
source: Energy Information Administration



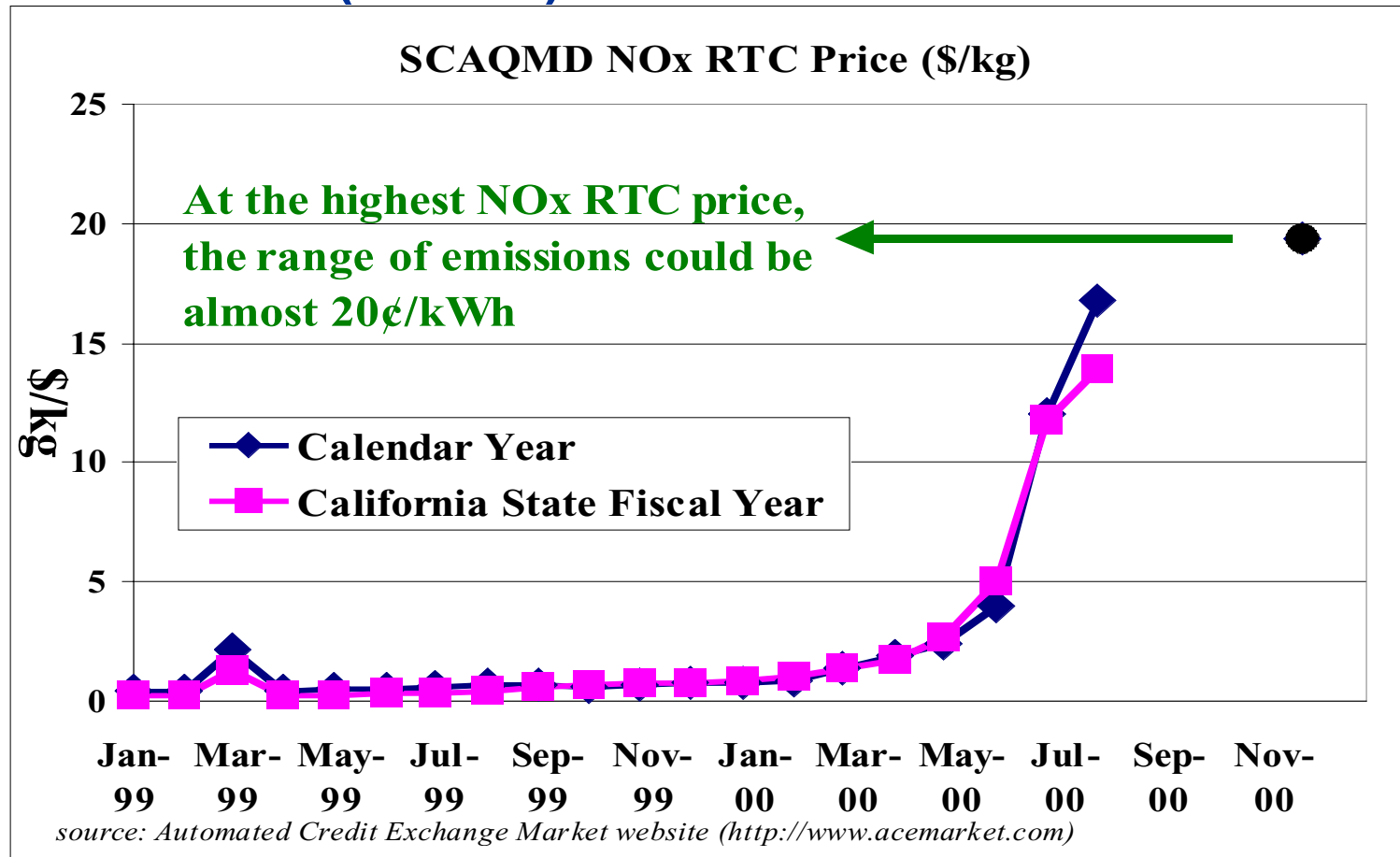
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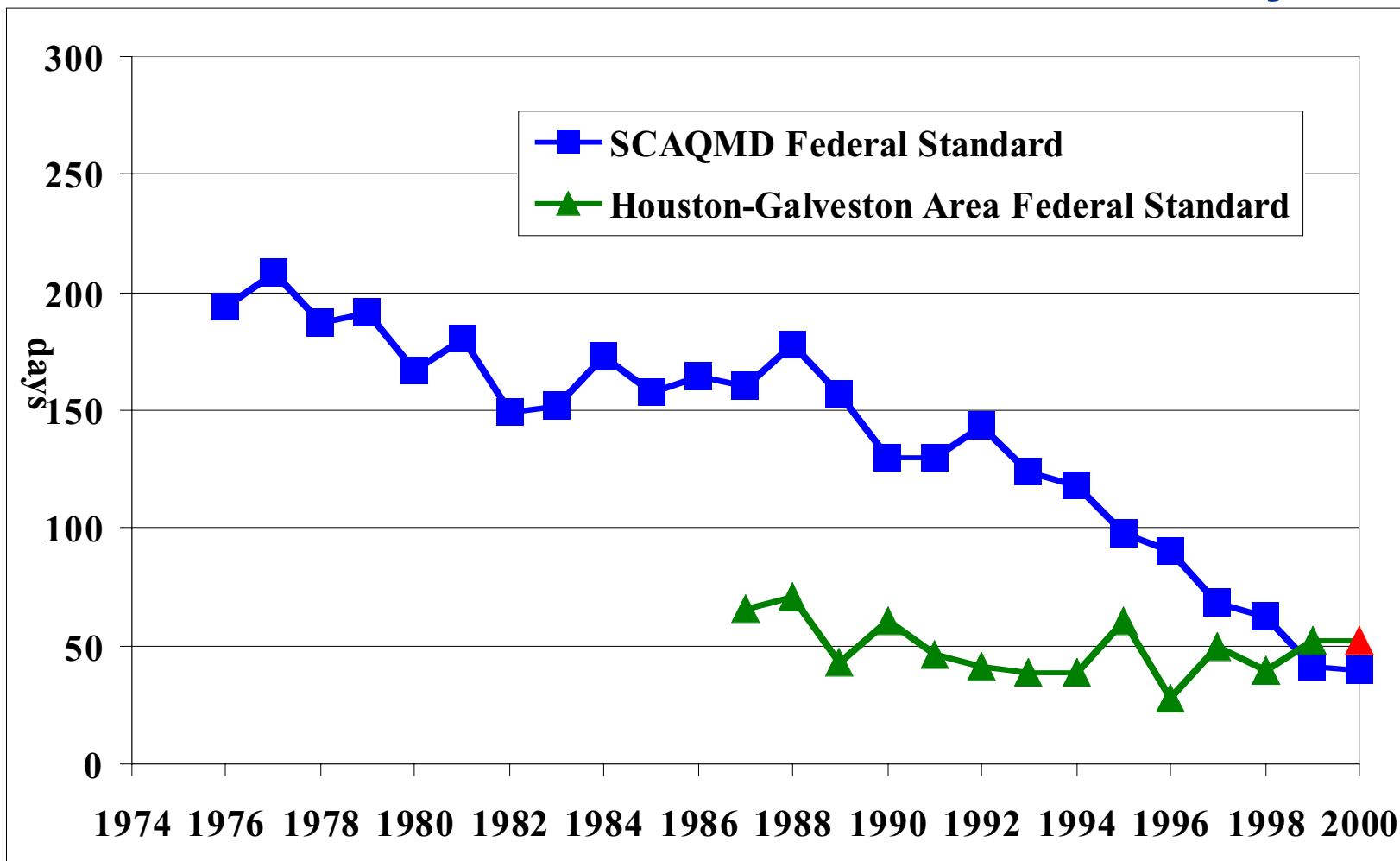
Gas Spot Price at PG&E Citygate for 2000



SCAQMD RECLAIM Trading Credit (RTC) Price for NOx



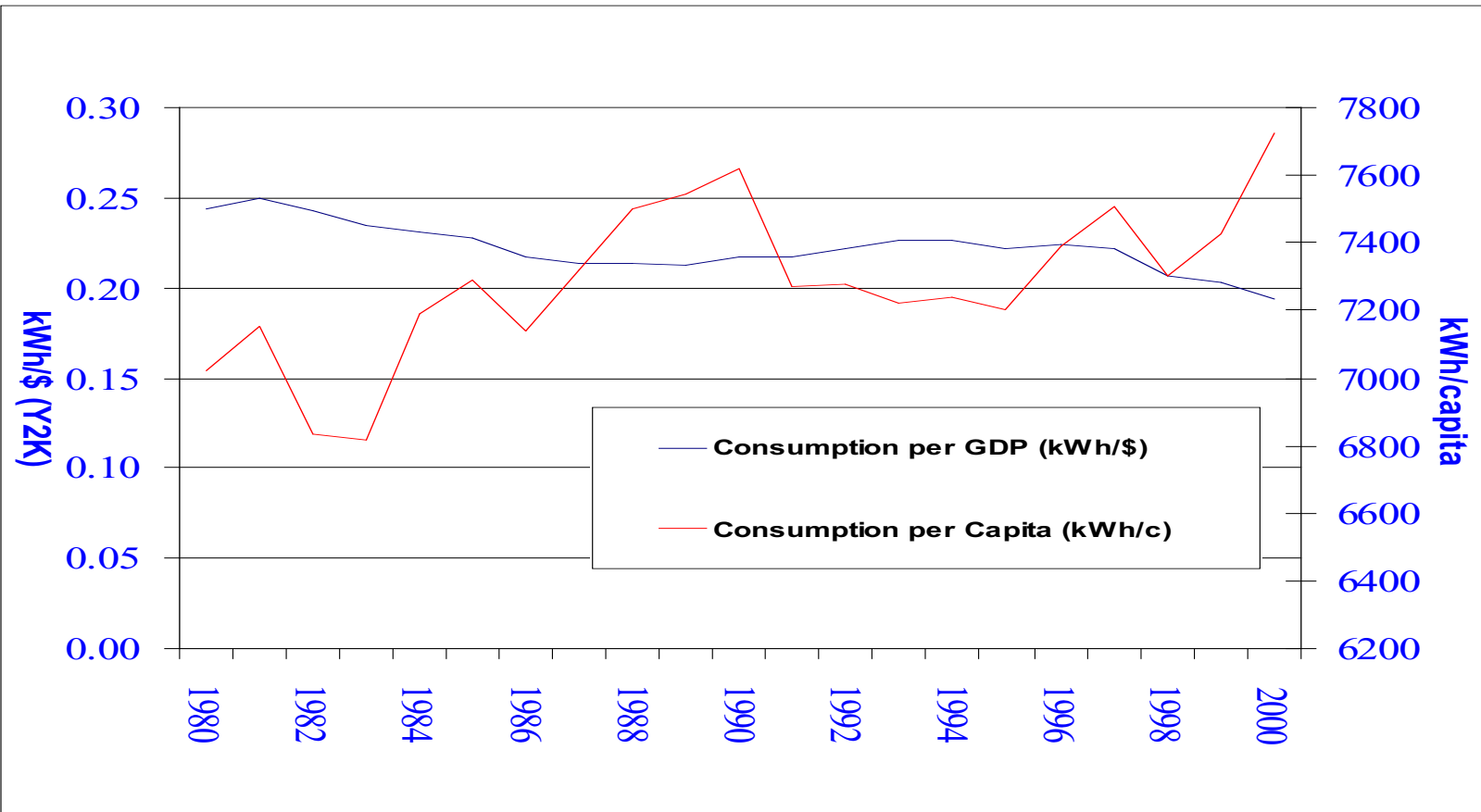
Federal Ozone Exceedance Days



California Electricity Demand Growth

- Internet Economy is a reliability problem
- Average Electricity Demand Growth 91-00 Was 1.4 %/a
 - but 2.5 %/a over last 5 years
 - growth in 1980's was 3.2 %/a
- Pockets of Growth Were Much higher (Santa Clara 9%?)
- All Office, Telecom, and Networking equipment accounts for only about 3 % of Electricity Consumption
- Minimal Evidence of Major Structural Change in Energy Usage Patterns

Electricity Consumption Per CA GDP and Per Capita



source: California Energy Commission



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Other Market Problems

- California Assumed Constant Import Capability
- Customer Growth & Dry Pacific Northwest Weather
- Slowness to Adopt Contracting and Hedging
- Failed Retail Market
- Lack of Price Information for Customer Investment

Conclusion

- Electricity Supply has a Long History of Difficulties
- Fundamental IMMEDIATE Problem is Supply-Demand Imbalance
- Ultimately Only Fix is by Pricing
- CA Environmental Rules Effective
- Opportunity for a Smooth “Transition” has been lost
- Political and Financial Constraints Dominate Public Policy
- Research Challenges to Creating a Viable Electricity Market
 - system control, market design and monitoring, DER, etc.

Web Sites of Interest

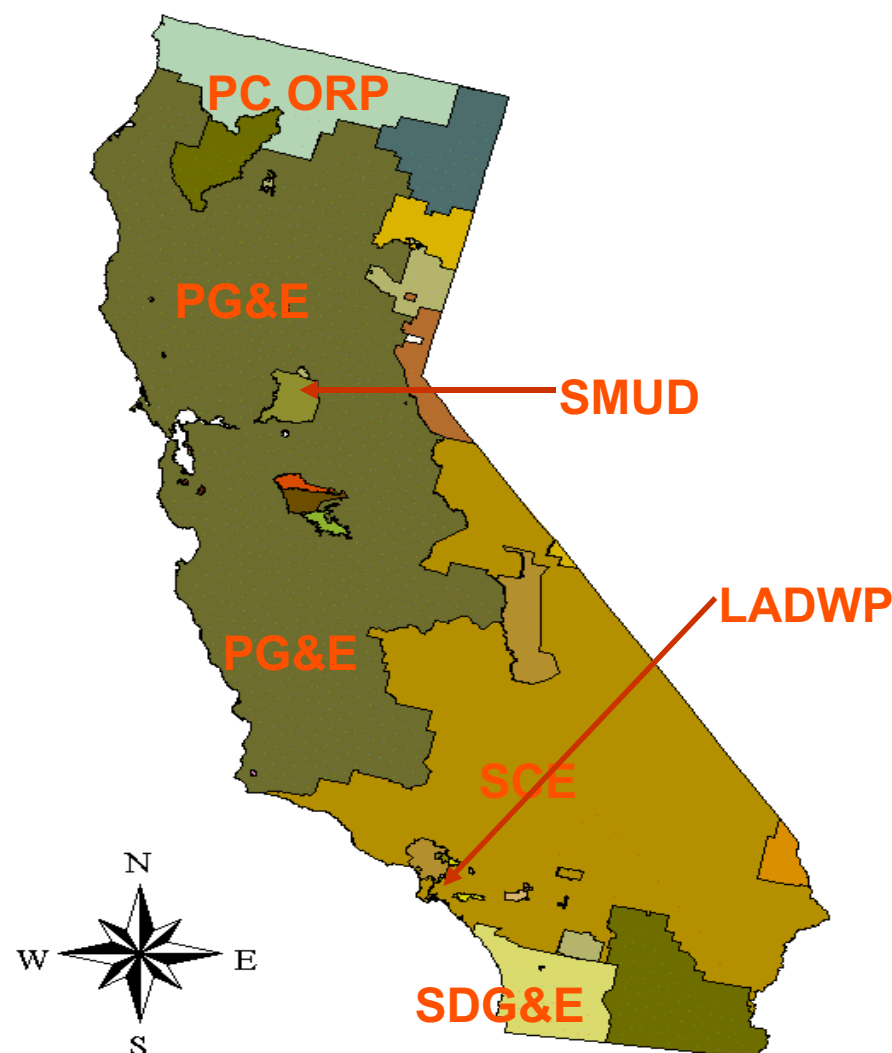
- <http://HomeEnergySaver.lbl.gov/>
- <http://enduse.lbl.gov/Projects/InfoTech.html>
- http://dailynews.yahoo.com/fc/Business/Utility_Industry_Deregulation/
- <http://www.caiso.com/>
- <http://certs.lbl.gov/>
- http://kanga-1.lbl.gov/WEBDB_CERTS/WEBDB_CERTS.home
- http://www.pserc.wisc.edu/index_home.html
- <http://www.ucei.org/>



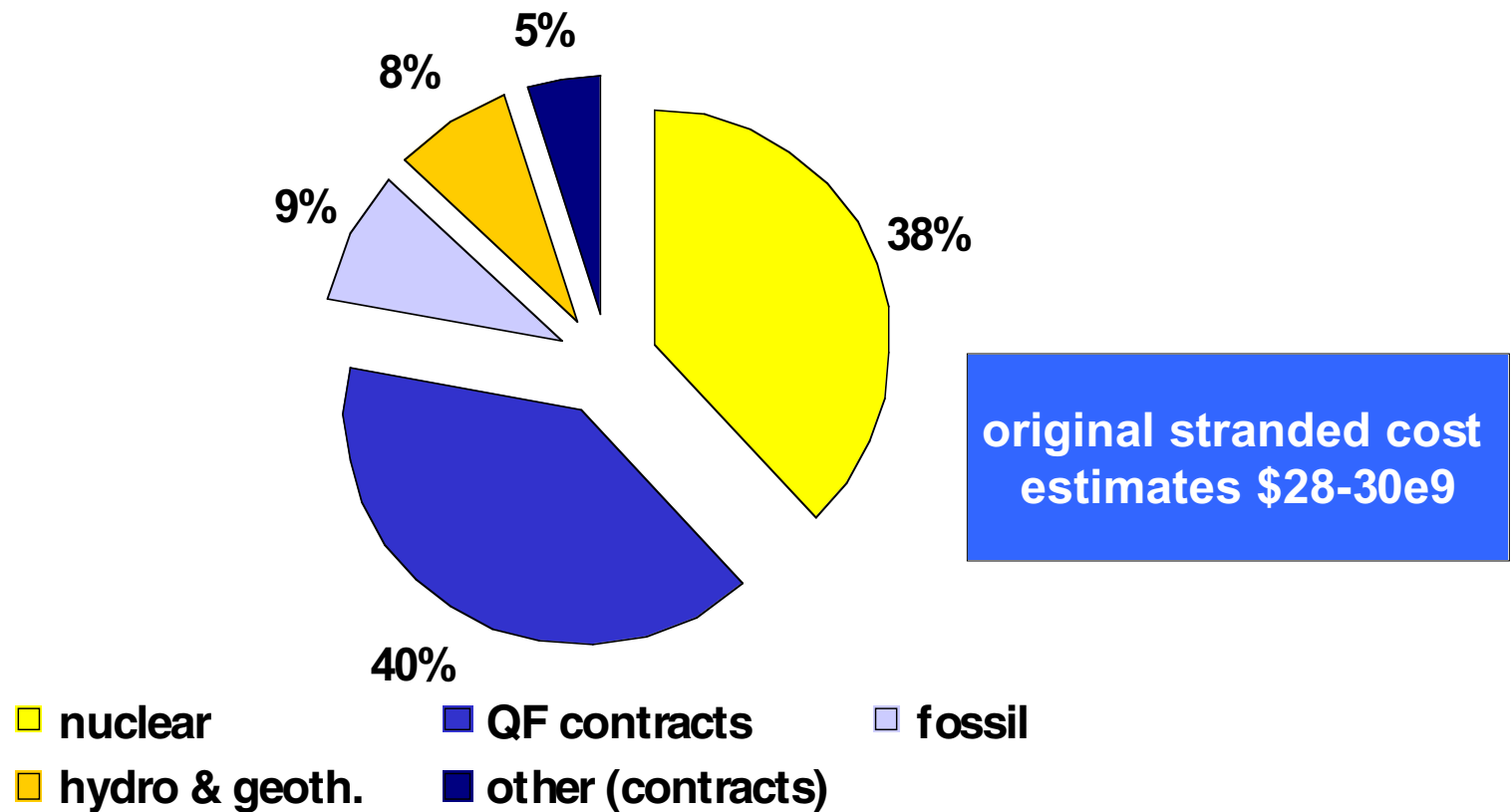
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Disco & Utility Service Territories



Stranded Costs



CERTS Mission Statement

To research, develop, and commercialize new methods, tools, and technologies to protect and enhance the reliability of the U.S. electric power system under the emerging competitive electricity market structure

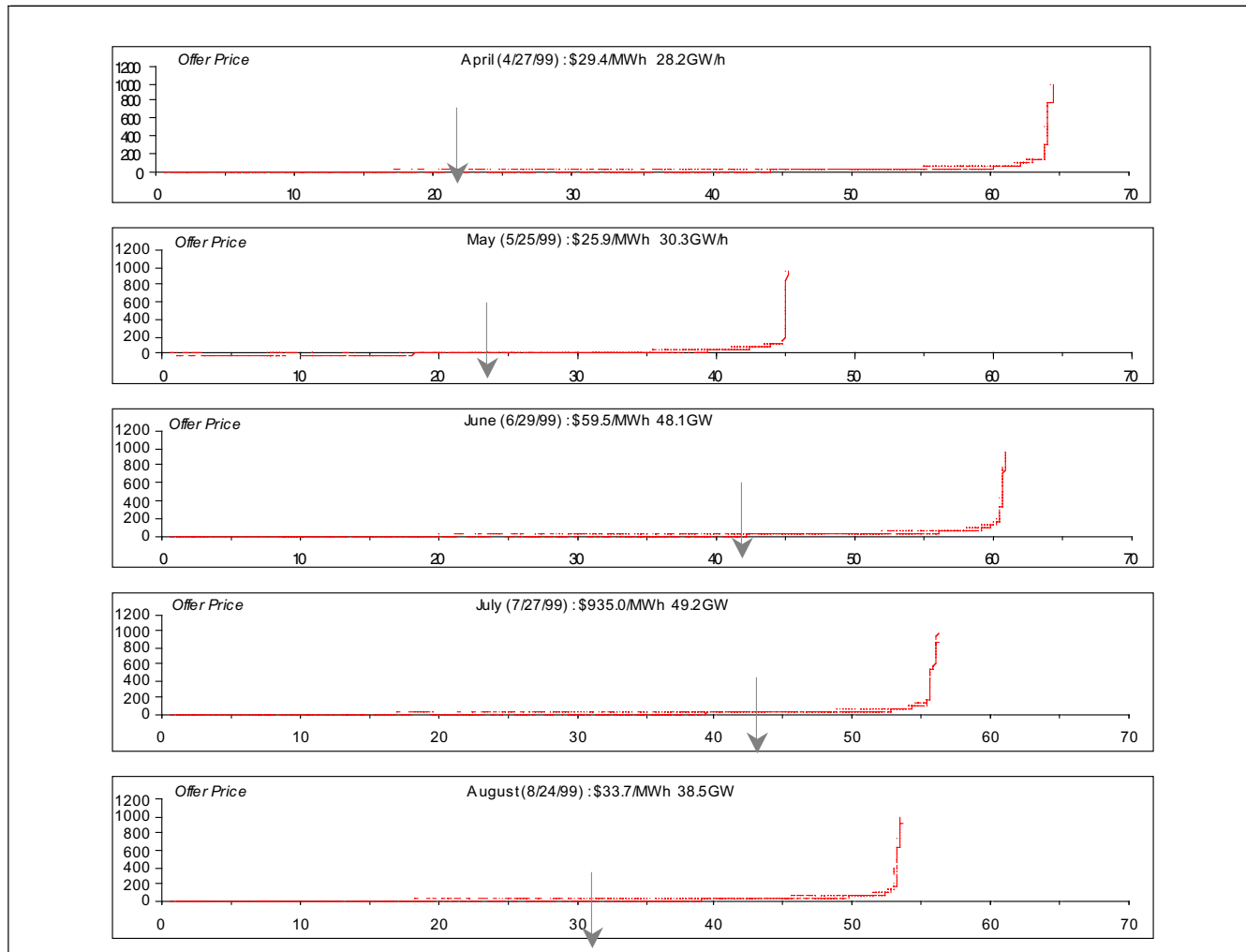


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Competitive Electricity Markets Set Prices Based on Supplier's Offers

PJM Aggregate Supplier Offer Curves April - August 2000 5 p.m.



EETD Webpage

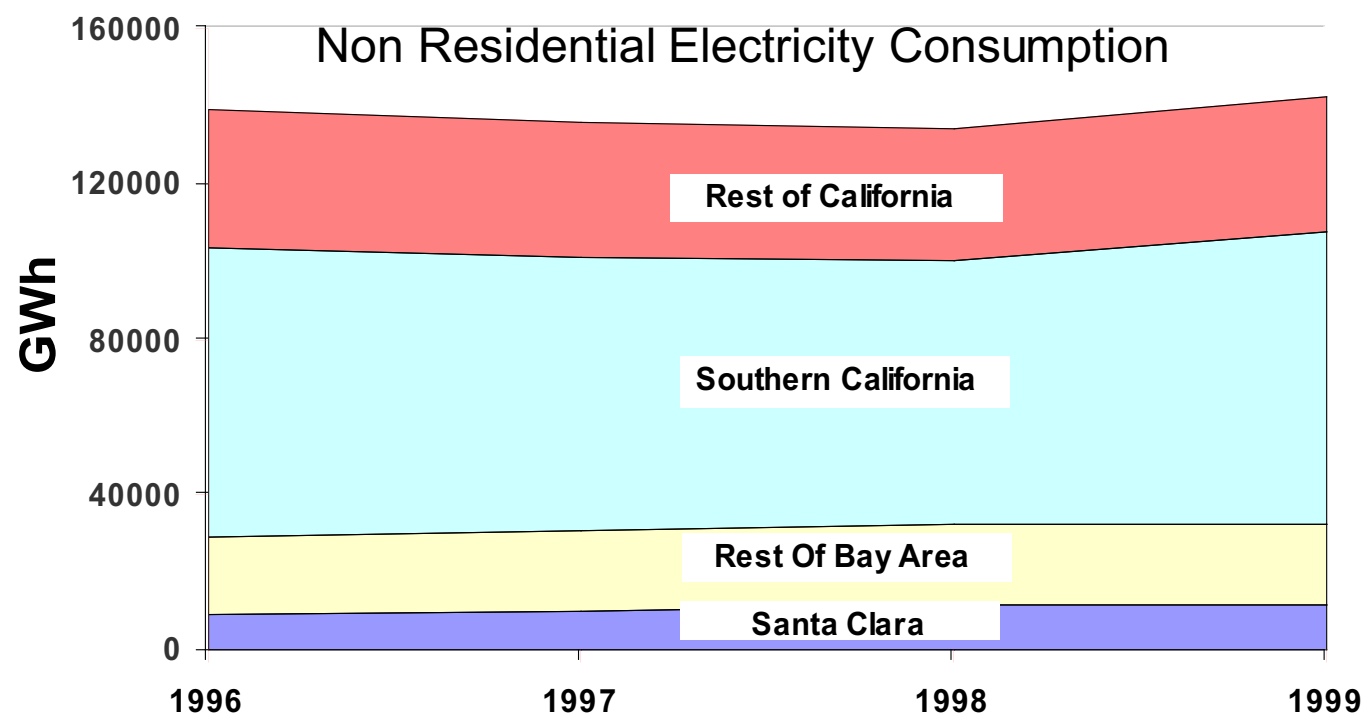


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California's Booming Economy NOT the Problem



Annual Demand Growth

Total Non-Res
0.9% / yr

SoCal

0.5% / yr

Bay Area: 3.3% / yr

**Santa Clara
County: 8.7% / yr**

	<u>1990-1999</u>	<u>1996-1999</u>
Total Electricity	1.3% per yr	1.8% per yr
Population	1.4% per yr	1.7% per yr
Gross State Product	4.3% per yr	7.3% per yr



Source: CEC, California Department of Finance

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